OF BLACK SHEEP AND WHITE CROWS:

IS BILINGUALS' MEMORY FOR FIGURATIVE MEANING

LANGUAGE-SPECIFIC?

A Senior Scholars Thesis

by

LENA KULIKOVA PRITCHETT

Submitted to the Office of Undergraduate Research
Texas A&M University
in partial fulfillment of the requirements for the designation as

UNDERGRADUATE RESEARCH SCHOLAR

April 2010

Major: Psychology
Russian

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Associate Dean for Undergraduate Research: Robert C. Webb

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ABSTRACT

Of Black Sheep and White Crows: Is Bilinguals' Memory for Figurative Meaning Language-Specific. (April 2010)

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Whereas several studies have examined figurative language comprehension in single language users, there is a relative lack of empirical work on this topic in multiple language users. Seeking to extend the scope of research on the bilingual mental lexicon beyond its previous single word emphasis, the present research examined incidental recall of familiar two-word idiomatic expressions in 22 Russian-English proficient bilinguals as a function of whether the idiomatic meaning of each expression was present in both languages, only in one language, or in neither language. It was hypothesized that phrases with a shared figurative meaning in both languages would be retrieved more easily than those for which a figurative meaning existed only in one language or in neither language. This expectation was confirmed. The findings are interpreted as consistent with a bilingual adaptation of the dual coding model of memory.

ACKNOWLEDGMENTS

I would especially like to thank Dr. Jyotsna Vaid for all her help and expertise during this project. She always had the right answers when I was desperately looking for one. I also appreciate the help provided by Sumeyra Tosun and Chaitra Rao, graduate students in the Language and Cognition Lab, who also contributed to this research. And, last but not least, thanks to my family (especially my husband) who supported me along the way and were always there for me when the project did not seem to move in the right direction.

NOMENCLATURE

L1	First spoken language
L2	Second language
Fig-Both	A phrase that has a figurative meaning in both English and Russian
Fig-English	A phrase that has a figurative meaning only in English language
Fig-Russian	A phrase that has a figurative meaning only in Russian language
Fig-Neither	A phrase that does not contain a metaphorical meaning in either English or Russian

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CHAPTER I

INTRODUCTION

The term “figurative language” refers to the use of a variety of expressions, from metaphors to jokes or proverbs, in which the intended meaning is other than the literal connotation of the expression. Indeed, figurative language is often preferred over literal one and forms the fabric of stirring speeches, topical songs, and treasured poetry.

It is now recognized that figurative language is highly pervasive in everyday language use. It has been estimated, for example, that for every minute of speech about four figurative expressions are produced (Pollio, et al., 1977) and that people use 1.8 novel and 4.1 conventional figurative expressions for each minute of discourse (based on a frequency count estimate by Glucksberg, 1989, cited in Cieslicka, 2006). Despite evidence of its pervasiveness, psycholinguistic research on the processes involved in the acquisition, comprehension, production, and retention of language has, until recently, focused primarily on literal language processing, guided in part by a prevailing view among language theorists that figurative language represents a non-obligatory use of language. This view, however, has come under attack, as a number of studies have now shown that figurative meaning activation can occur as rapidly and automatically as literal meaning activation (Gibbs, 1994; Giora, 2002; Glucksberg, 1991). On the other

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This thesis follows the style of *Bilingualism: Language and Cognition*.

hand, all these studies have focused on language processing in single language users. Given that bi- and/or multilingualism is "no longer the exception" (Harris and McGhee-Nelson, 1992) but rather the norm, viewed globally, it is important to extend research on figurative language processing to bilingual language users. This was the aim of the present research.

Before turning to the present study it is important to provide a brief overview of figurative language research in the first language and in bilinguals, ending with a discussion of a model of bilingual memory that formed the basis for predictions underlying the present study, which examined memory for idiomatic expressions in bilinguals.

Figurative language processing – cognitive and neurocognitive approaches

A number of studies have explored hemispheric differences in processing figurative language in brain-damaged and, more recently, brain-intact individuals. This research has been useful in bringing to light important distinctions not only between literal and figurative expressions but between different types of figurative expressions, such as conventional vs. novel metaphors.

Faust and Mashal (2007) used the divided visual field paradigm to compare conventional metaphoric expressions and novel metaphoric phrases taken from poetry along with literal and nonsense phrases. Their main question was the degree of the right

hemisphere's involvement in the processing of different categories of figurative language by native Hebrew speakers. Participants were shown the phrases in the left or right visual field and had to decide if those phrases were meaningful. The results suggested the right hemisphere activated a broader range of related meanings during word recognition as compared to the left hemisphere.

Another study, also conducted by Mashal, Faust, Hendler, and Jung-Beeman (2007), examined novel and conventional metaphors and directly compared them to literal and meaningless expressions. Mashal et al. (2007) examined the processing of unfamiliar metaphors using event related potentials while participants performed a semantic judgment task. The authors suggested that while retrieving the conceptual meaning of the novel metaphors was more demanding than retrieving the meaning of conventional metaphors or literally related words, both novel and conventional metaphors were accessed, at least initially, in a similar manner, by the right hemisphere.

Many other studies conducted in this field similarly find that the right cerebral hemisphere appears to be specialized for understanding and producing metaphorical meaning (e.g., Brownell, Simpson, Bihrle, Potter, and Gardner, 1990; Weylman, Brownell, Roman, and Gardner, 1989; Klepousniotou and Baum, 2005).

However, despite a preponderance of studies that support the right hemisphere dominance view, other studies support an opposing perspective. They demonstrate left

hemisphere superiority or no hemispheric differences in metaphor comprehension (Olivery, Romero, and Papagno, 2004; Lee, and Dapretto, 2006; Faust and Weisper, 2000). For example, Olivery, Romero, and Papagno (2004) used repetitive transcranial magnetic stimulation (rTMS) to interrupt the function of the left versus right cerebral hemisphere while participants performed a semantic judgment task with conventional metaphors and literal phrases. The results suggested that comprehension of idioms and literal sentences depends on the left temporal cortex, not the right one.

A recent study (Mashal and Faust, 2009) has introduced a new perspective on the matter. In this study, participants made plausibility judgments for phrases presented to the different visual fields. After some time, the test subjects were given the same task again. On the first round, novel phrases showed a left field advantage; but on the second round there was no visual field difference in processing figurative phrases. The authors suggest that this reflects a shift in processing novel phrases - by the second round the meaning of the expressions was simply retrieved directly from memory whereas on the first round it was created; and only novel meanings (those that have to be created rather than retrieved) show a right hemisphere advantage.

Taken together, the studies thus far suggest that there is a special role of the right hemisphere in understanding and producing metaphorical language, particularly for novel metaphorical expressions. Nevertheless, more research still needs to be done to pinpoint and confirm the actual mechanisms underlying right hemisphere involvement.

Figurative and literal meanings in L1 idiom processing models

It is crucial to understand figurative language processing in the first language in order to comprehend its mechanism in the second one. A variety of models deconstructing the cognitive processing of metaphorical phrases by native speakers have been proposed and tested empirically.

The traditional view of processing figurative language treats novel expressions as a peculiar form of literal speech. This view is known as the Standard Pragmatic View (Searle, 1975; Grice, 1975). According to this model, in order to understand a figurative phrase, one initially must comprehend its literal meaning, and if it does not make sense only then does one decode the figurative meaning. This model implies that literal and figurative languages are processed differently with literal meaning always preceding the figurative or metaphorical one.

Other models of processing propose that both literal and non-literal meanings are activated when comprehending idiomatic phrases. These models vary in terms of whether they prioritize literal or figurative meaning.

One such alternative model is the Idiom Decomposition Model (Gibbs and Nayak, 1989; Gibbs, Nayak, and Cutting, 1989), which suggests that comprehending metaphorical phrases depends on the degree to which individual meanings of every word contribute to the overall understanding of the phrase. Researchers found evidence suggesting that

processing decomposable idioms (ones whose individual components contribute to the overall meaning of the idiom) is faster than processing non-decomposable idioms (idioms whose components do not contribute to the general meaning of the phrase). Gibbs and Nayak (1989) referred to the Idiom Decomposition Model in their study of the syntactic behavior of idioms. They hypothesized that because some idioms can be syntactically altered and still hold their figurative meanings, (e.g., "John laid down the law" can be passivized: "The law was laid down by John"), while others tend to lose it (e.g., "John kicked the bucket" cannot be passivized into "The bucket was kicked by John"), the time required to process these two categories of idioms will vary. Their hypothesis was supported: people found it challenging to assign independent meanings to non-decomposable idioms' individual constituents. In short, these phrases required more time to process.

Another compositional model of figurative language processing emphasizes the role of literal meaning in constructing a figurative expression (Cacciari and Tabossi, 1988; Cacciari and Glucksberg, 1991). It suggests that a metaphorical phrase is initially processed literally but, with emergence of figurative connotations, literal meaning is terminated in favor of idiomatic meaning.

The two models of figurative language processing discussed above differ in terms of prioritizing literal or figurative meanings; yet not all models of the cognitive processing of figurative language originate from this perspective. Giora's graded salience

hypothesis (1999; 2002; 2003) proposes that salience rather than degree of figurativeness is the critical factor in determining primacy of processing. Giora defines salient meanings as the ones that "enjoy prominence due to their conventionality, frequency, familiarity, or prototypicality" (2002: pp. 490). Thus, for Giora, salient meanings (whether literal or figurative) are processed initially. As a result, Giora (2003) hypothesized that figurative expressions that already exist (and are, therefore, familiar) will show a processing and/or retrieval advantage over novel plausible figurative expressions. The results supported her hypothesis. Further, Giora (1999) showed that processing of familiar metaphors involved activation of both literal and figurative meanings, regardless of the context in which they were used. On the other hand, processing less familiar metaphors activated literal meaning first, whether the metaphors were presented in a literal or figurative meaning-inducing context.

Figurative and literal meanings in L2

The models introduced above demonstrate the various existing views on processing idioms in a person's first language. What might be the case for the second language, or for individuals who acquired two languages simultaneously?

As Cieslicka (2006) notes: "The abundance of L1 idiom processing studies has been accompanied by a regrettable lack of comparable research into the representation and processing of idiomatic expressions by second language learners" (p. 119). Indeed, there

is a need for more research on figurative language processing in speakers of more than one language (Vaid, 2000).

A few theories of processing figurative L2 have been proposed. One is an L2 adaptation of Giora's graded salience hypothesis, termed the Literal Salience Model (Cieslicka, 2006; Liontas, 2002). This model argues that literal meaning is more salient in L2 users even if the phrase is presented in a figurative context. Cieslicka (2006) employed a cross-modal lexical priming paradigm to test this model. Her participants (Polish-English bilinguals from Poland) were auditorily presented with sentences that contained familiar idioms. While listening to each phrase, participants were visually presented with a word that either related to the figurative or to the literal meaning of the idiom, and they had to perform a lexical decision task on that word. Cieslicka (2006) found that priming effects obtained by targets that were related to the literal meaning were greater than priming elicited by targets related to the idiomatic meaning. Thus, literal meanings were initially accessed much faster than figurative meanings in L2 idiom processing, supporting the Literal Salience Model.

Another model, Dual Idiom Representation (Abel, 2003), extends to the L2 the findings of Titone and Connine (1999) in their study of figurative L1 language. Titone and Connine discovered that metaphorical phrases were simultaneously processed as non-compositional and compositional word sequences. More specifically, they argued parallel representation of the idiom's meaning as a whole unit along with the individual

representation of its constituents parts. Similarly, the Dual Idiom Representation model in regards to figurative L2 processing postulates that decomposability determines the representation of the idiom. Non-decomposable idioms require a separate lexical entry while decomposable idioms do not.

Frequency was also found to play an important role in the development of an idiom's entry in the bilingual's mind (Abel, 2003). The more frequently a phrase is used in its metaphorical sense, the more likely it will have its own lexical entry.

Using a bilingual adaptation of the Glucksberg's (1991) metaphor interference task to study whether figurative meaning is automatically activated in both L1 and L2 of bilinguals, Martinez (2003) presented Spanish-English speakers with sentences in each language on which they were to make speeded true/false judgments on the basis of whether the sentences were literally true or literally false. Inserted among the sentences were metaphorically true sentences that were, nevertheless, literally false. It was hypothesized that if figurative meanings are automatically activated, participants should take longer to reject such sentences as literally false, resulting in the so-called "metaphor interference effect." This effect was in fact obtained, in both languages. Other studies similarly suggest that figurative meanings are activated automatically in both languages of bilinguals, but that proficiency may affect the ease of their activation (see Matlock and Heredia, 2002, as described in Cieslicka, 2006).

Bilingual memory research

A dominant issue underlying research in bilingualism and memory from its earliest days (e.g., Ervin and Osgood, 1954) has been to examine, through a range of experimental methods, whether word meanings in the bilinguals' two languages are organized in a single, shared system or in separate systems (de Groot, 2002; Durgunoglu and Roediger, 1987; Kroll and de Groot, 1997; see Marian, 2008, for a review of bilingual memory models). The shared system view is also known in the literature as the "interdependence hypothesis" and the separate systems view is known as the "independence hypothesis." Moreover, differences in the context of language acquisition by bilinguals were thought to favor the development of one or the other form of lexical organization; that is, an interdependent or shared system was thought to be more likely among bilinguals who acquired their two languages simultaneously and/or in similar contexts (so-called "compound" bilinguals) whereas an independent form of organization was thought to characterize bilinguals who acquired their two languages in separate contexts, typically, with the second language acquired much later than the first one, so-called "coordinate" bilinguals (see Ervin and Osgood, 1954). A number of studies have been conducted to test these hypotheses and empirical support has been obtained for each.

In an attempt to reconcile the findings, some researchers have proposed that whether the evidence supports a single store view or a separate store view of memory representation may depend on the processing demands of the retrieval tasks used. That is, conceptually-driven tasks such as free recall and recognition tasks, it was proposed,

would more likely yield support for a shared store view, whereas data-driven tasks such as lexical decision, word fragment completion and naming were thought to more likely support a separate store view (Durgunoglu and Roediger, 1987).

The debate about bilingual lexical organization and the effect of particular circumstances of bilingual's language acquisition on lexical organization has, in recent years, given way to questions about whether words in the bilingual's two languages are selectively or nonselectively activated. This shift in focus has arisen as online measures have increasingly come to be used in psycholinguistic research (see de Groot and Kroll, 1997). Nevertheless, the basic questions remain even while it is recognized that earlier approaches (with certain exceptions, such as the dual coding model of Paivio and Desrochers, 1980, discussed below in the lead up to the present study) did not present clear and testable ways of answering them (Heredia, 2008).

Studies of figurative language and bilingual memory

Not many studies have been conducted in this area; yet a few interesting findings have been made. Vaid and Martinez (2001) examined Spanish-English bilinguals' incidental recognition memory for the language of proverbs presented in a mixed language list. Memory of language of presentation was tested for familiar and less familiar proverbs in English and Spanish as a function of whether the proverbs had to be paraphrased or translated in the study phase. The aim of the study was to determine whether the wording of proverbs is retained or if proverb meaning is stored conceptually. The results

showed that bilinguals were good at recognizing the language in which the proverb had been presented in the study phase, suggesting that they retained the wording of the proverbs. If proverbs' meanings are stored in a conceptual mode, participants should have been poor at detecting the initial language in which the proverb had been presented. Other studies of figurative language comprehension in bilinguals have examined memory for metaphors vs. similes by bilinguals (e.g., Harris, Tebbe, Leka, Garcia, and Erramouspe, 1999).

The present study

To date very little research on bilingual memory has examined the issue of lexical organization beyond the level of single words, with the result that very few studies have examined the organization and processing of idioms or other figurative expressions in speakers of two or more languages (but see Cieslicka, 2006; Vaid and Martinez, 2001; Martinez, 2003). The present research was designed to redress this gap.

Dual coding model

Our starting point was the bilingual extension of the dual coding model of memory developed by Paivio and Desrochers (1980; see also Paivio, 1990). The original version of Paivio's dual coding model argued that lexical entries have two interconnected mental representations: a symbolic representation and an imaginal representation. A vast amount of research supports the claim of the model that memory for pictorially encoded stimuli should be superior to that for verbally encoded stimuli. The model has also led

to a veritable cottage industry of research on the advantage in recall for concrete over abstract words, as concrete words presumably tap into both the symbolic and the imaginal representations. This "concreteness effect" is a robust finding in the bilingual memory literature as well (see de Groot, 2002).

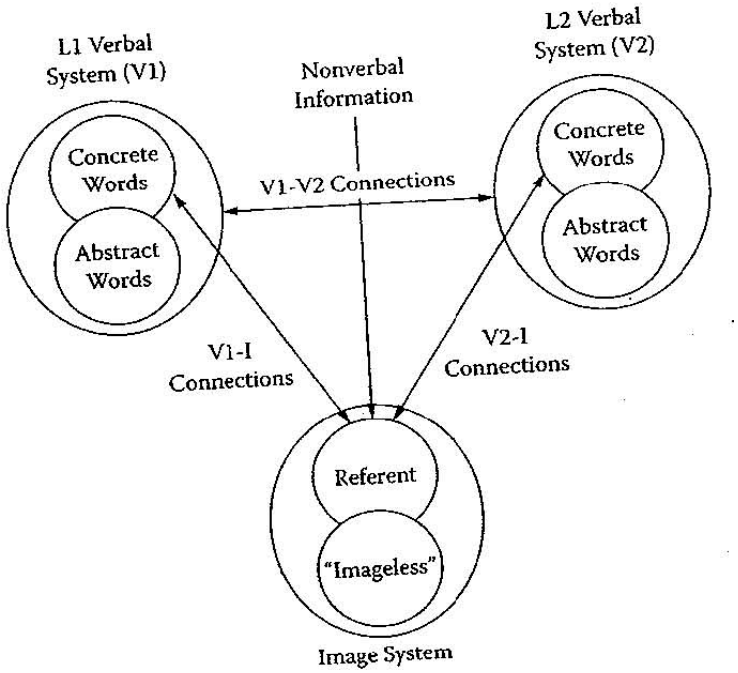

FIGURE 1. Paivio and Desrocher's (1980) bilingual dual coding model (as cited in Heredia, 2008, p. 51)

The bilingual adaptation of the dual coding model, proposed by Paivio and Desrochers (1980), argued for a language-free imaginal representation and two symbolic representations, corresponding to each language. See Figure 1 for a visual representation of this model as cited in Heredia (2008; p. 51). The two symbolic (or verbal) systems are separate but linked by connections. As Heredia (2008, p. 51) notes

in his review of bilingual memory models, the bilingual dual coding model, unlike previous models, “is formulated well enough so as to generate specific predictions about bilingual memory.”

The model proposes that connections between entries across the two verbal systems are stronger than those within each system. As such, the model predicts that memory should be better for translation equivalents than for words that are synonyms within a language (Vaid, 1988). Studies using an incidental memory paradigm by Paivio and Lambert (1981), Paivio, Clarke and Lambert (1988) and Vaid (1988) tested this model and found empirical support for the view that retrieval is better for words that were pictorially encoded than for words that were verbally encoded (consistent with the general dual coding principle of superior retrieval for imaginally-represented mental representations). Moreover, it was discovered that words that had been translated in the acquisition phase showed better recall than words that had been copied or paraphrased in the same language (Nelson, 1992). Thus, retrieval was better when the task required activation of entries in different languages than when it required activation of entries in a single language.

The focus of the present study was on memory for two-word idiomatic expressions, such as “blue moon” which in English means “a rare occurrence.” Although previous research on the bilingual dual coding model focused on single words, we reasoned that a similar prediction could be made with respect to two-word phrases. Specifically, it was

hypothesized that two word idiomatic phrases that have a shared meaning in both languages of bilinguals will show a higher level of recall than phrases that have an idiomatic meaning in only one of the languages or in neither language. The study design involved an incidental cued recall paradigm. An additional question examined was whether retrieval of phrase meaning would be greater when there was a match between the language of the cue word (which was the first word of the two word phrase) and the language in which the phrase was initially presented. Based on the encoding specificity principle (Tulving and Thomson, 1973), we expected this to be the case.

CHAPTER II

METHOD

Participants

Participants were proficient English-Russian bilinguals (5 males and 20 females, ranging in age from 17 to 30 with a mean age of 27) who either volunteered to take part in this study or received course credit for their participation. Participants' level of language proficiency was determined on the basis of a detailed language background questionnaire they filled out during the experiment. To be eligible to participate in the study, participants had to rate themselves as at least 4 out of 7 in overall proficiency in reading, writing, speaking, and understanding in each language.

Twenty-five participants were tested but three of them rated themselves as less than 4 in proficiency in one of their languages and therefore, their data were excluded from the analysis. Of the remaining 22 participants, 15 were native Russian speakers (11 females and 4 males with a mean age of 29) and 7 had English as their first language (6 females and 1 male, mean age of 23). Native English speakers were undergraduate students majoring in Russian language at Texas A&M University; native Russian speakers were from the Russian immigrant community in Bryan/College Station and Navasota, TX, and had lived in the U.S. for an average of 8 years.

Stimuli and procedure

Twenty four English adjectives and their equivalent Russian translations were paired with four nouns according to the following criteria: the adjective-noun phrase had a commonly known figurative meaning in both languages (henceforth, Fig-Both), it had a figurative meaning only in one of the languages (henceforth, Fig-English or Fig-Russian), or it was meaningless in both languages (henceforth, Fig-Neither). For example, "blue blood/голубая кровь" has a figurative meaning in both languages, "blue moon/голубая луна" only has a figurative meaning in English, "blue distances/голубые дали" only has a figurative meaning in Russian, and "blue smell" is meaningless in both languages. Phrases were pretested with native speakers of each language to ensure that their figurative meaning was recognizable. Phrases selected in Russian and English were translation equivalents and employed the same adjectives and nouns in both languages. Nouns were not repeated across different adjectives to avoid confusion (e.g., the noun "blood/кровь" was only used in combination with "blue/голубой" and no other adjective). For a complete list of stimuli see the Appendix.

Participants were tested individually or in small groups of two to three people at a time. The room provided for the experiment was well-lit and quiet. The experiment had two phases: an acquisition phase and a test phase. In the acquisition phase, participants were shown all the 96 phrases in a random order and were required to rate them on degree of pleasantness of their meanings, using a 5 point scale, with 1 being "very unpleasant" and 5 being "very pleasant." For example, "dirty joke/грязная шутка" implies an

unpleasant meaning and could be rated as 1, while “warm greeting/тёплое приветствие” usually has a positive connotation and could be rated as 5. Participants were informed that some phrases might not make sense to them (e.g., “blue smell/голубой запах,” “rich parachute/богатый парашют” or “dirty cough/грязный кашель”) and were advised to rate those phrases to the best of their knowledge. For example, despite the fact that “dirty cough” is not an actual phrase, it conveys an unpleasant meaning while “rich parachute” might imply a pleasant connotation, and “blue smell” may be more neutral. Participants were provided three examples and were encouraged to ask questions if the task was not clear to them.

After all participants had completed the acquisition phase, they were administered the language background questionnaire (a copy of which can be found in the Appendix), which also served as a filler task, and took approximately 5-10 minutes to complete. Following that, the test phase was initiated. A list of 24 adjectives (henceforth, “cues”) was presented, and participants had to recall the four nouns that had accompanied each cue. Half of the adjectives in the test phase appeared in the same language as at original presentation, whereas the remainder appeared in translation (i.e., a phrase that had previously been presented in English was now presented in Russian translation, and one that had initially been presented in Russian was now presented in English translation).

Participants were also asked to rate their confidence level for each noun they were recalling. They were asked to rate their confidence on a five-point scale, with 1 being

"not at all confident" and 5 being "very confident" about encountering that noun in the previous phase. Participants were required to take the language of recall into consideration when doing the rating; that is, their confidence was to reflect both the actual noun and the language in which they recalled it.

Design

A 4x2x2x2 mixed factorial design was used, with the within-subjects variables being Phrase Type (Figurative meaning in both languages, Figurative in English only, Figurative in Russian only, or Figurative in neither), and the between subjects variables being Language at Initial Presentation (English or Russian), Language of the Cue at Recall Time (Same or Different), and Participant's Native Language (English or Russian).

CHAPTER III

RESULTS

A 4x2x2x2 ANOVA was conducted on three response measures: mean accuracy of recall (considered in two ways, as described below) and mean confidence ratings, each of these analyzed as a function of Phrase Type (Fig-Both, Fig-English, Fig-Russian, and Fig-Neither), Language at Initial Presentation (English or Russian), Language of the Cue at Recall Time (Same or Different), and Participant's Native Language (English or Russian). The accuracy data were analyzed in two ways. One way considered all responses generated by participants without regard to whether they were in the correct language (i.e., the language of initial presentation). In this analysis, if a participant saw "blue moon" in the acquisition task, but recalled it as "луна" (Russian word for "moon") it was still considered a correct answer. The second analysis looked only at responses that were generated in the language of initial presentation. Finally, the confidence ratings were also analyzed.

Mean accuracy for each phrase type is summarized in Table 1. For the analysis that was done without regard to the accuracy of language at recall there was a significant main effect of Phrase Type , $F(1, 20) = 27.766$, $p < .001$, which indicated that Fig-Both phrases were remembered significantly more accurately than any other category of phrases.

Comparison of the means revealed that Fig-Both phrases were remembered significantly more accurately than Fig-English phrases, $t(21)=2.932$, $p < .01$, Fig-Russian phrases, $t(21)=3.434$, $p < .01$, and Fig-Neither, $t(21)=5.593$, $p < .001$. Additionally, Fig-English phrases were recalled significantly better than Fig-Neither, $t(21)=3.232$, $p < .01$, and Fig-Russian phrases were remembered significantly better than Fig-Neither, $t(21)=2.238$, $p < .05$. Overall, nonsense phrases seem to be the hardest to retrieve; phrases that had figurative meanings in both languages were more easily retrieved that those that only had a figurative meaning in one language (see Figure 2).

TABLE 1. Mean recall (and standard deviation) of figurative expressions by phrase type

	Figurative in Both Languages	Figurative in English only	Figurative in Russian only	Nonsense
Accuracy regardless of language at presentation	5.77(3.32)	3.91(2.45)	3.50(1.99)	2.41(2.46)
Accuracy with regards to language at presentation	4.95(2.98)	3.45(2.34)	2.95(2.08)	2.18(2.32)
Confidence ratings	3.10(1.22)	2.74(1.31)	2.36(1.12)	1.70(1.30)

Another mixed analysis of variance (ANOVA) was performed on the same data, but this time with regards to the language of recall. Only phrases remembered in the language of acquisition were counted in this analysis. More specifically, if a participant saw "blue moon" in the acquisition task, but recalled it as "луна," it was not considered a correct answer. Again, a Phrase Type main effect was found, $F(1, 20) = 27.061$, $p < .001$,

showing that Fig-Both phrases were more likely to be recalled than the other three types (see Figure 3).

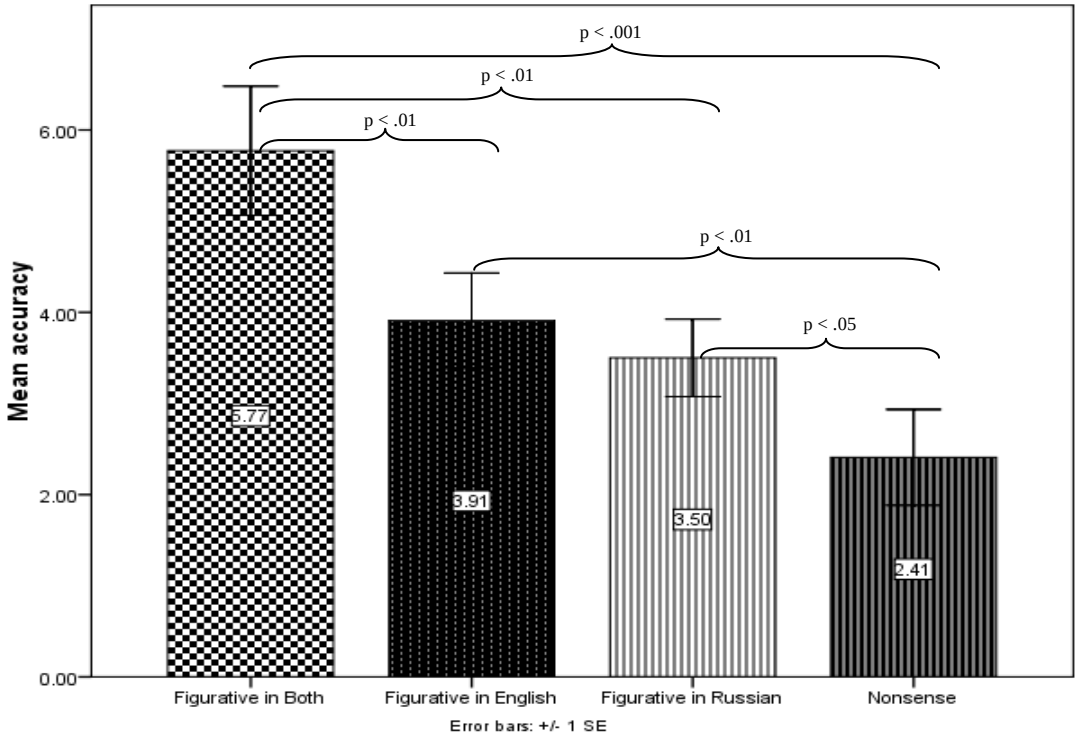

FIGURE 2. Mean overall recall accuracy as a function of phrase type in the condition without regards to language of initial presentation

Phrase type main effect post-hoc analysis showed similar relationships between the different categories of phrases as in the previous results. When only phrases recalled in the same language as at the initial presentation were considered, Fig-Both phrases were recalled significantly more accurately than Fig-English phrases, $t(21)=2.537$, $p < .05$, significantly more accurately than Fig-Russian phrases, $t(21)=3.510$, $p < .01$, and significantly more accurately than Fig-Neither phrases, $t(21)=5.271$, $p < .001$.

Furthermore, Fig-English phrases were remembered significantly better than Fig-Neither, $t(21)=2.704$, $p < .05$. But unlike in the previous analysis, Fig-Russian phrases were not remembered better than Fig-Neither, $t(21)=1.859$, $p = .077$. Overall, nonsense phrases were again the least recalled ones while phrases with figurative meanings in both languages enjoyed an advantage in recall.

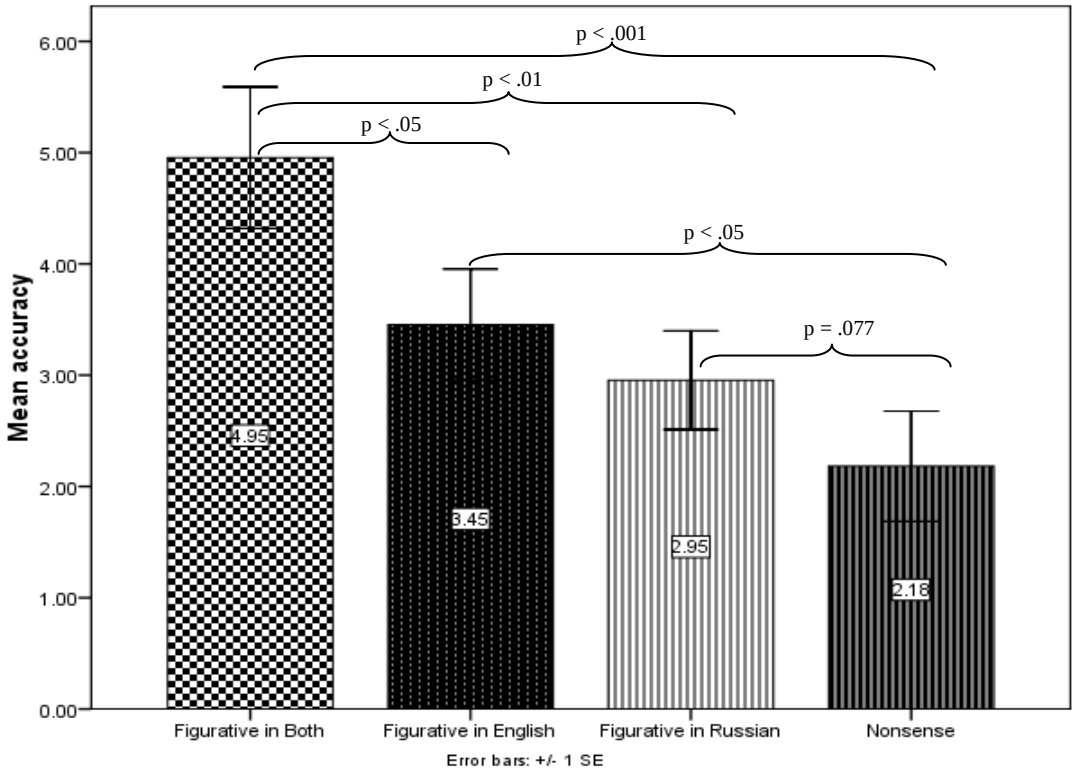

FIGURE 3. Mean overall recall accuracy as a function of phrase type in the condition with regards to language of initial presentation

Although it was of interest to examine if the nouns were recalled in a particular order, e.g., whether Fig-Both items were recalled before Fig-English or Fig-Russian items, no

order effect was observed. This may be due to the generally low level of recall since the task was very demanding and participants could not remember all four nouns for each adjective. Further experiments employing a recognition task could clarify this issue.

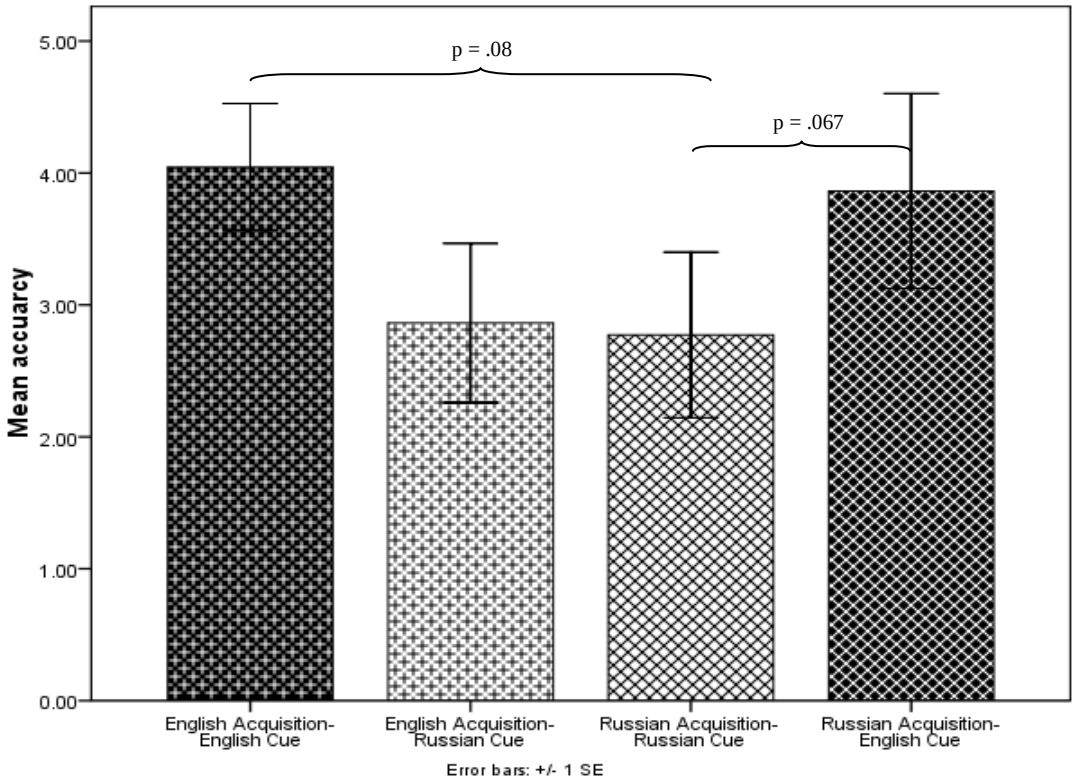

FIGURE 4. Mean recall accuracy of each phrase type as a function of language of item at initial presentation and at recall

In addition to the main effect of Phrase Type, there was a near significant interaction between Language at Acquisition and Cue Language, $F(1, 20)=4.068$, $p = .057$; see Figure 4. Post-hoc analyses showed that participants tended to recall more phrases when they originally saw them in English and were presented with an English cue at recall

time (*M*=4.05, *SD*=2.26) than when they initially saw them in Russian and were presented with a Russian cue (*M*=2.77, *SD*=2.94), *t*(21)=1.843, *p* = .08. Additionally, participants tended to recall more phrases they initially saw in Russian when presented with an English cue at recall time (*M*=3.86, *SD*=3.47) than when presented with a Russian cue at recall time (*M*=2.77, *SD*=2.94); *t*(21)=1.929, *p* = .067.

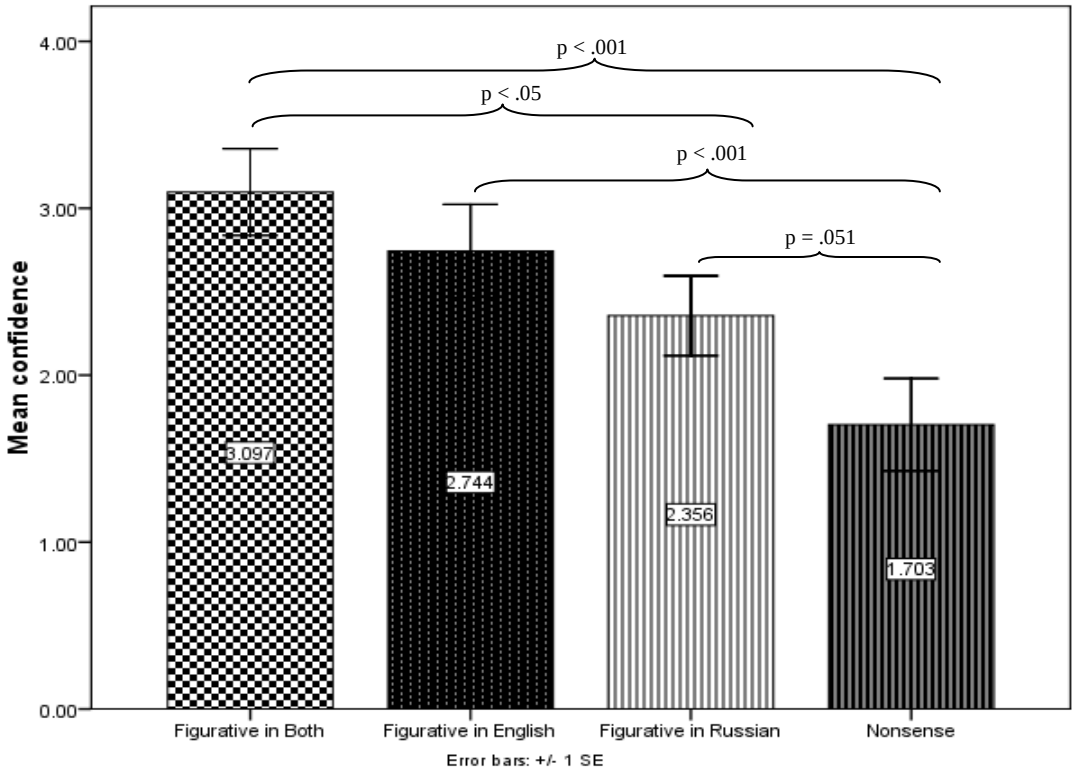

FIGURE 5. Mean confidence ratings of recalled responses by phrase type

Analysis of confidence ratings also revealed interesting tendencies. A Phrase Type main effect was discovered, *F*(1, 24)=25.823, *p* < .001, indicating that participants were

significantly more confident when remembering phrases that shared a figurative meaning in both languages than phrases with nonsense meanings (see Table 1).

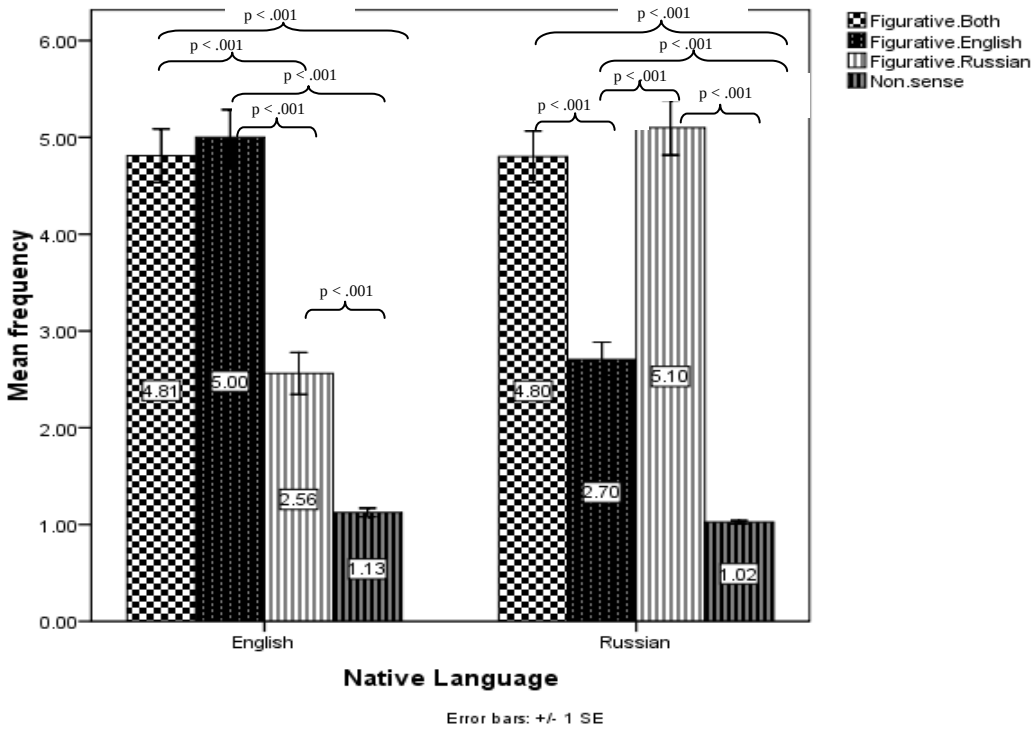

FIGURE 6. Mean perceived frequency ratings according to phrase type and native language

Participants were significantly more confident when recalling Fig-Both phrases (*M*=3.10, *SD*=1.22) than Fig-Neither phrases (*M*=1.70, *SD*=1.30), *t*(21)=4.280, *p* < .001, or Fig-Russian phrases (*M*=2.36, *SD*=1.12), *t*(21)=2.271, *p* < .5. Additionally, participants were significantly more confident when remembering Fig-English phrases (*M*=2.74, *SD*=1.31) than Fig-Neither phrases (*M*=1.70, *SD*=1.30), *t*(21)=4.011, *p* < .001. When recalling Fig-Russian phrases (*M*=2.36, *SD*=1.30) participants felt more confident

than when recalling Fig-Neither phrases (M=1.70, SD=1.30), $t(21)$=2.071, p = .051. Overall, participants felt more confident when recalling Fig-Both phrases and the least confident when remembering Fig-Neither phrases (see Figure 5). There was no interaction effect.

To rule out some alternative explanations for the discovered tendencies we collected data about the phrases' perceived frequency (see Table 2) and imageability (see Table 3) from monolingual speakers of each language (these were individuals who had not been tested in previous tasks and know only one language – English or Russian).

TABLE 2. Mean subjective frequency judgments (based on 7 pt scale**)** by phrase type

	English monolinguals' ratings (n=7)	Russian monolinguals' ratings (n=5)	Total
Figurative in both languages	4.44	4.43	8.87
Figurative in English	4.42	2.39	6.82
Figurative in Russian	2.35	4.71	7.05
Nonsense	1.04	0.95	1.98

A 2 (Native Language: English vs. Russian) X 4 (Phrase type: Fig-Both, Fig-English, Fig-Russian, Fig-Neither) repeated measures ANOVA was conducted on the frequency ratings reported by monolinguals (i.e. how often they encounter each one of the 96 phrases). A Phrase Type main effect was found, $F(1, 10)$=245.264, $p < .001$ as was an interaction of Phrase type and Native Language, $F(1, 10)$=10.158, $p < .01$; see Figure 6.

The interaction effect indicated that for native Russian speakers there was no difference in perceived frequency of phrases with figurative meanings in both languages and phrases with figurative meanings only in Russian. Similarly, for English monolinguals, there was no difference in perceived frequency of phrases with figurative meanings in both languages and phrases with figurative meanings only in English.

TABLE 3. Mean subjective ratings of phrase imageability (based on 7-point scale) by phrase type

	English monolinguals' ratings (n=7)	Russian monolinguals' ratings (n=5)	Total
Figurative in both languages	4.49	4.98	9.47
Figurative in English	4.54	2.91	7.45
Figurative in Russian	3.86	4.62	8.49
Nonsense	2.69	1.25	3.93

Analysis of imageability of the phrases (i.e. how easy it is to visualize the meaning of each of the 96 phrases) showed a main effect of Phrase Type, $F(1, 10)=38.897$, $p < .001$, and a Phrase Type by Native Language interaction effect, $F(3, 30)=11.872$, $p < .001$; see Figure 7. The interaction effect indicated that for native Russian speakers there was no difference in perceived imageability of phrases with figurative meanings in both languages and phrases with figurative meanings only in Russian. Similarly, for English monolinguals, there was no difference in perceived imageability of phrases with figurative meanings in both languages and phrases with figurative meanings only in English.

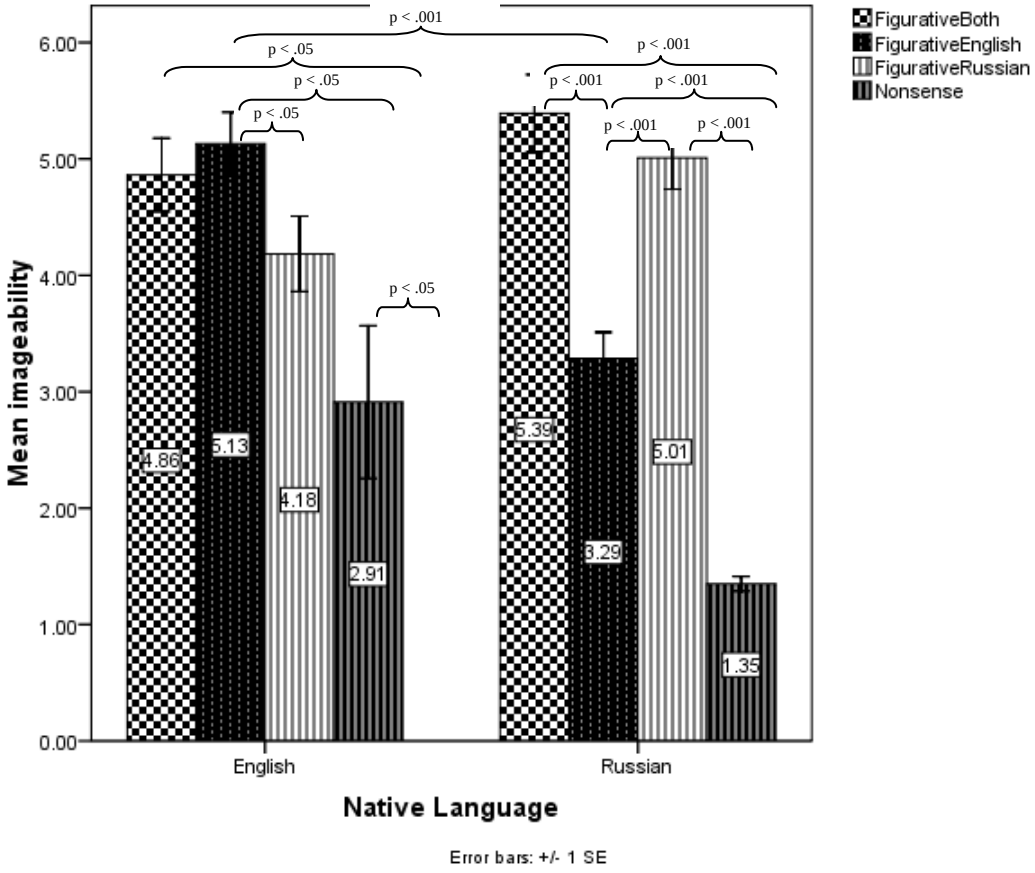

FIGURE 7. Mean imageability ratings according to phrase type and native language

These results allow us to conclude that stimuli belonging to the Figurative-Both condition were not intrinsically more familiar or more imageable than stimuli belonging to the Figurative in the native language conditions, as judged by native speakers of each language. Therefore, the differences in retrievability observed in the present study are not due to any greater familiarity or imageability of phrases in the Figurative-Both condition.

CHAPTER IV

SUMMARY AND CONSLUSIONS

Comparing different categories of figurative language that exist in bilinguals' mental lexicon we predicted that phrases that have identical metaphorical meaning in more than one language of bilinguals will be better remembered and retrieved than those that only have meanings in one language, in accordance with Paivio's (1990) bilingual dual coding theory of memory. Despite the fact that the recall task was very demanding and overall accuracy of recall was low (30.17% when we counted all responses without regard to the language in which they were recalled and 13.79% when we considered only phrases that were recalled in the same language as they were acquired in the study phase), we still see a consistent effect of better recall of phrases that have a shared figurative meaning in both of the bilinguals' languages, in support of our prediction.

Accuracy of recall regardless of the language of the stimulus in the acquisition phase

Bilinguals were significantly better at recalling phrases with figurative meaning in both languages than phrases in any other condition (i.e., figurative in one of their languages or figurative in neither language). Furthermore, participants were significantly better at remembering phrases with figurative meaning in only one language than nonsense ones. This trend was also predicted because nonsense metaphors are novel and do not have an entry in the mental lexicon. These findings are consistent with Paivio and Desrocher's

(1980) dual coding theory proposing that lexical entries with dual representations are more likely to be remembered than those that are only represented once (see also Paivio and Lambert, 1981; Vaid, 1988). Likewise, nonsense phrases are the hardest ones to retrieve since they presumably do not map onto any existing representation in the lexicon.

Accuracy of recall with regards to the language of the stimulus in the acquisition phase

Similarly, when we only considered phrases recalled in the language in which they were first presented, recall was highest for phrases with figurative meanings in both languages. Even though the overall level of recall was much lower in this way of analyzing the data than in the one reported in the previous section, recall of phrases figurative in one language was still higher than recall of nonsense ones.

Additionally, there was one near significant interaction between Input language and Cue language (p=.057). The interaction suggests that the condition yielding the highest recall was when the phrase language was English and the cue language was also English (on average, 4.05 items recalled); the next highest condition was when the phrase language was Russian and the cue language was English (on average, 3.86 items recalled). In general, recall was poorer when the language of the cue at recall was Russian. Thus, our expectation that recall would be higher when language at the acquisition phase and cue phase was the same was only partially supported; English language cues (for phrases that

appeared initially in either English or Russian) seemed to have a beneficial effect in recall. It would appear that participants were more comfortable with the English language than with Russian, even though more than half of them had acquired English as a second language. A possible explanation of this phenomenon could be the fact that participants had lived in the U.S. for some time and were therefore more used to operating in English. To test this interpretation of the findings, a follow-up study should be conducted with bilinguals living in Russia to determine if the dominant language of the environment influences people's recall accuracy.

Confidence ratings

Level of confidence was highest for Fig-Both phrases, relative to Fig-Russian and Fig-Neither phrases. Participants were least confident about nonsense phrases and significantly more confident about Fig-English and Fig-Russian phrases than about nonsense ones. Thus, not only did participants show more accurate recall of phrases that had figurative meanings in both languages, they were also more confident about encountering them previously.

Language acquisition background

Participants were drawn from two different backgrounds: one in which people acquired English as their second language in their teen years, the other one in which people learned Russian as their second language in college. The variable representing their native language war controlled for and was not found to be statistically significant. That

is, participants' language acquisition background did not affect their accuracy of recall of the different phrase types. It is possible that with a larger sample differences may have emerged.

Phrase type frequency and imageability

To examine if the findings could be attributable to other factors such as differences in familiarity or imageability of the phrases, an analysis of frequency and imageability ratings by a sample of monolingual Russian and monolingual English speakers was conducted but showed no evidence for this alternative potential explanation. The results for both dimensions showed no difference in ratings for the figurative-in-both items and the figurative-in-their-native-language items, thereby ruling out possible differences in perceived frequency and/or imageability of the different phrase types as an alternative explanation of the observed difference in recall.

Caveats

One potential limitation of the present research was that we did not actually check to see if the bilingual participants knew the figurative meanings of all the stimuli in each language. One possible reason for why recall was so low (particularly for phrases in Russian) may be the fact that participants were less familiar with the idiomatic meanings of some of the Russian phrases. In future research it will be important to verify that participants knew the intended meanings of the expressions.

A more likely reason for the low overall level of recall was that the task was made very difficult by the fact that there were simply too many items to be recalled. Use of a recognition procedure rather than a recall procedure would probably have resulted in better performance. Nevertheless, despite the low level of overall recall, our findings showed a significant difference in relative recall by phrase type, in support of our prediction.

Conclusion

Taken together, and consistent with Paivio and Desrocher's (1980) dual coding theory of bilingual memory, the present findings suggest that items that have a dual representation in memory (as is presumably the case for the phrases that have a figurative meaning in both languages) yield better retrieval than items that have a single representation in memory (as is presumably the case for phrases that have a figurative meaning in only one of the languages). By extension, the present findings are compatible with an independence view rather than an interdependence perspective of bilingual memory representation, that is, a view in which the two linguistic systems of bilinguals are kept two systems functionally separate in representation. However, converging evidence from other experimental approaches (e.g., priming) will be important to strengthen this conclusion. It is hoped that the findings of the present research lead to more investigations into figurative language comprehension in bilinguals.

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APPENDIX

List of Stimuli

Figurative in both languages		Figurative in neither languages (Nonsense)	
black humor	черный юмор	black nonsense	черная ерунда
blue blood	голубая кровь	blue smell	голубой запах
broken dreams	Разбитые мечты	broken coffee	разбитый кофе
clean conscience	чистая совесть	clean dirt	чистая грязь
cold woman	холодная женщина	cold hobby	холодное хобби
deep pockets	глубокие карманы	deep leg	глубокая нога
dirty joke	грязная шутка	dirty cough	грязный кашель
empty words	пустые слова	empty rain	пустой дождь
fat wallet	толстый кошелек	fat eyes	толстые глаза
fresh eye	свежий взгляд	fresh fire	свежий пожар
golden rule	золотое правило	golden wind	золотой вздох
green envy	зеленая зависть	green idea	зеленая идея
happy life	счастливая жизнь	happy floor	счастливый пол
heavy mood	тяжелое настроение	heavy height	тяжелая высота
hot temper	горячий темперамент	hot snow	горячий снег
iron man	железный человек	iron movie	железное кино
last straw	последняя соломинка	last earth	последняя земля
long day	длинный день	long emotion	длиная эмоция
low income	низкая зарплата	low knife	низкий нож
open question	открытый вопрос	open rain	открытый дождь
red army	красная армия	red breakfast	красный завтрак
second nature	вторая натура	second air	второй воздух
soft heart	мягкое сердце	soft computer	мягкий компьютер
warm greeting	теплое приветствие	warm thunder	теплый гром
Figurative Only in English		Figurative Only in Russian	
black sheep	черная овца	black stripe	черная полоса
blue moon	голубая луна	blue distance	голубые дали
broken record	разбитая запись	broken hopes	разбитые надежды
clean break	чистый прорыв	clean luck	чистое везение
cold turkey	холодная индейка	cold weapon	холодное оружие
deep meaning	глубокое значение	deep phrase	глубокая фраза
dirty dog	грязная собака	dirty play	грязная игра
empty suit	пустой костюм	empty sound	пустой звук
fat chance	толстый шанс	fat magazine	толстый журнал
fresh start	свежий старт	fresh anecdote	свежий анекдот
golden grain	золотое зерно	golden hands	золотые руки

green thumb	зеленый палец	green street	зеленая улица
happy hour	счастливый час	happy number	счастливое число
heavy foot	тяжелая нога	heavy head	тяжелая голова
hot air	горячий воздух	hot point	горячая точка
iron will	железное желание	iron road	железная дорога
last laugh	последний смех	last fashion	последняя мода
long face	длинное лицо	long tongue	длинный язык
low profile	низкий профиль	low opinion	низкое мнение
open season	открытый сезон	open lesson	открытый урок
red letter	красная буква	red girl	красная девица
second thoughts	вторые мысли	second breath	второе дыхание
soft sell	мягкая продажа	soft character	мягкий характер
warm heart	теплое сердце	warm house	теплый дом

Language Background Questionnaire

UIN: _____
Name:_____
Today's date: _____
Email:_____
Age:_____
Place of Birth _____

1) What is your first language, i.e. what you first learned to speak first? (If more than one, state all): _____

2) When did you learn other language(s)?
___ 0-4 years
___ 5-8 years
___ 9-12 years
___ 12-18 years
___ 18-25 years
___ 26-30 years
___ 31-40 years
___ > 41 years

3) How often do you use Russian language during the day:
____ less than 10% of the time
____ 10-20% of the time
____ 20-30% of the time
____ 30-40% of the time
____ 40-50% of the time
____ 50-60% of the time
____ 60-70% of the time
____ 70-80% of the time
____ 80-90% of the time
____ 90-100% of the time

4) How often do you use English language during the day:
____ less than 10% of the time
____ 10-20% of the time
____ 20-30% of the time
____ 30-40% of the time
____ 40-50% of the time
____ 50-60% of the time
____ 60-70% of the time
____ 70-80% of the time
____ 80-90% of the time
____ 90-100% of the time

5) How do you define yourself in terms of ethnic or cultural identity to others outside your ethnic group?

____ Russian
____ Eastern European
____ Western European
____ Asian
____ Middle Eastern
____ American
Other _____ (please specify)

6) Please indicate how much you enjoy:
Scale: 1=Not at all, 2=Very Little, 3=A little, 4= A lot 5=Always

Listening to music in Russian	_____
Watching TV programs or movies in Russian	_____
Travelling to Russian-speaking countries	_____
Listening to music in English	_____
Watching TV shows or movies in English	_____
Travelling and visiting in the US	_____

7) What kinds of grades do/did you usually get in high school?

____ Mostly As
____ Mostly As and Bs
____ Mostly Bs
____ Mostly Bs and Cs
____ Mostly Cs
____ Mostly Cs and Ds
____ Mostly Ds
____ Mostly Ds and Fs
____ I failed high school

8) What kinds of grades do/did you usually get in college?

____ Mostly As
____ Mostly As and Bs
____ Mostly Bs
____ Mostly Bs and Cs
____ Mostly Cs
____ Mostly Cs and Ds
____ Mostly Ds
____ Mostly Ds and Fs
____ I dropped out of college

9) Please rate your language ability in English and Russian on a 7 point scale where 1=very little knowledge and 7=use it like a native speaker:

Speak English _____
Read English _____
Write English _____
Understand English _____
Speak Russian _____
Read Russian _____
Write Russian _____
Understand Russian _____

10) In which language(s) do you/would you typically do each of the following activities:

Express affection _____
Express anger _____
Pray _____
Dream _____
Think to yourself _____
Tell jokes or funny stories _____
Keep a diary _____

11) In which language(s) do you feel you can communicate most effectively?

_____

12) When speaking with other bilinguals how often do you switch between languages during a conversation? (circle the right answer or check "do not speak to other bilinguals")

Rarely All of the time
1 2 3 4 5
Do not speak to other bilinguals ____

THANK YOU!

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